Species at Risk Act
Action Plan Series

Action Plan for Multiple Species of Atlantic Coastal Plain Flora in Canada

Pink Coreopsis
Thread-leaved Sundew
Water Pennywort
Goldencrest
Plymouth Gentian

2018

Government of Canada
Gouvernement du Canada

Canada

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For copies of the action plan, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, recovery strategies, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

Cover illustration:
Atlantic Coastal Plain Flora lakeshore habitat, Tusket River, Nova Scotia; inset photos (from left) Goldencrest (*Lophiola aurea*), Pink Coreopsis (*Coreopsis rosea*), Thread-leaved Sundew (*Drosera filiformis*), and Plymouth Gentian (*Sabatia kennedyana*). Photos from the Wildlife Division, NS Department of Natural Resources (NS DNR).

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[1] http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of action plans for species listed as Extirpated, Endangered, and Threatened for which recovery has been deemed feasible. They are also required to report on progress within five years after the publication of the final document on the SAR Public Registry.

Under SARA, one or more action plan(s) provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for the species. The plan outlines what needs to be done to achieve the population and distribution objectives (previously referred to as recovery goals and objectives) identified in the recovery strategy, including the measures to be taken to address the threats and monitor the recovery of the species, as well as the proposed measures to protect critical habitat that has been identified for the species. The action plan also includes an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation. The action plan is considered one in a series of documents that are linked and should be taken into consideration together. Those being the COSEWIC status report, the recovery strategy, and one or more action plans.

The Minister of Environment and Climate Change is the competent minister under SARA for the Pink Coreopsis, Thread-leaved Sundew, Water Pennywort, Goldencrest and Plymouth Gentian and has prepared this action plan to implement the recovery strategy, as per section 47 of SARA. The minister responsible for the Parks Canada Agency (PCA) is a competent minister for the Water Pennywort, where the species occurs on lands administered by PCA. To the extent possible, it has been prepared in cooperation with the Province of Nova Scotia, the Atlantic Coastal Plain Flora (ACPF) Recovery Team, environmental non-government organizations, industry stakeholders, aboriginal groups, and private landowners, as per section 48(1) of SARA.

Success in the recovery of these species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions and actions set out in this action plan and will not be achieved by Environment and Climate Change Canada or Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this action plan for the benefit of the Pink Coreopsis, Thread-leaved Sundew, Water Pennywort, Goldencrest and Plymouth Gentian, and Canadian society as a whole.

Implementation of this action plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

[2] http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2

The recovery strategy sets the strategic direction to arrest or reverse the decline of the species, including identification of critical habitat to the extent possible. It provides all Canadians with information to help take action on species conservation. When critical habitat is identified, either in a recovery strategy or an action plan, SARA requires that critical habitat then be protected.

In the case of critical habitat identified for terrestrial species including migratory birds SARA requires that critical habitat identified in a federally protected area[3] be described in the *Canada Gazette* within 90 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry. A prohibition against destruction of critical habitat under ss. 58(1) will apply 90 days after the description of the critical habitat is published in the *Canada Gazette*.

For critical habitat located on other federal lands, the competent minister must either make a statement on existing legal protection or make an order so that the prohibition against destruction of critical habitat applies.

If the critical habitat for a migratory bird is not within a federal protected area and is not on federal land, within the exclusive economic zone or on the continental shelf of Canada, the prohibition against destruction can only apply to those portions of the critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies as per SARA ss. 58(5.1) and ss. 58(5.2).

For any part of critical habitat located on non-federal lands, if the competent minister forms the opinion that any portion of critical habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, or the laws of the province or territory, SARA requires that the Minister recommend that the Governor in Council make an order to prohibit destruction of critical habitat. The discretion to protect critical habitat on non-federal lands that is not otherwise protected rests with the Governor in Council.

[3] These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Birds Convention Act, 1994* or a national wildlife area under the *Canada Wildlife Act* see ss. 58(2) of SARA.

Acknowledgments

This action plan was prepared by Samara Eaton with assistance from the Atlantic Coastal Plain Flora (ACPF) Recovery Team. The efforts of the Atlantic Coastal Plain Flora Recovery Team are gratefully acknowledged. This action plan builds on previous iterations of ACPF recovery plans, dating back to the initial plan written by the recovery team in 1998. The Team has been integrally involved in recovery and conservation efforts on the ground as well as in the strategic planning aspects. Many organizations and individuals have played an important role in recovery actions already completed or underway and their efforts are greatly appreciated.

Executive Summary

The primary focus of this action plan is on the five federally listed endangered and threatened Atlantic Coastal Plain Flora (ACPF) species: Pink Coreopsis (*Coreopsis rosea*); Thread-leaved Sundew (*Drosera filiformis);* Goldencrest (*Lophiola aurea);* Plymouth Gentian (*Sabatia kennedyana*); and Water Pennywort (*Hydrocotyle umbellata*). However, this plan also addresses other high priority ACPF species including: Eastern Baccharis (*Baccharis halmifolia*); Sweet Pepperbush (*Clethra alnifolia);* Tubercled Spike-rush (*Eleocharis tuberculosa*); New Jersey Rush (*Juncus caesariensis*); Redroot (*Lachnanthes caroliniana*); Eastern Lilaeopsis (*Lilaeopsis chinensis*); Spotted Pondweed (*Potamogeton pulcher*); and Long's Bulrush (*Scirpus longii*). Should the SARA legal status of any species addressed in this document change, the document will be updated as required.

Critical habitat was fully identified in the Amended Recovery Strategy and Management Plan for Multiple Species of Atlantic Coastal Plain Flora in Canada for Pink Coreopsis, Water Pennywort, Plymouth Gentian, Thread-leaved Sundew and Goldencrest. No critical habitat is identified in this document. Examples of activities likely to result in the destruction of critical habitat are outlined in the Amended Recovery Strategy and Management Plan. Proposed measures to protect critical habitat are presented in section 1.4.

This action plan, to be implemented in Nova Scotia, addresses the objectives and recommended strategic approaches outlined in the Amended Recovery Strategy and Management Plan. Recovery measures are organized according to the seven objectives identified in the Amended Recovery Strategy and Management Plan and the implementation schedule identifies which threats the measures address, indicates the level of priority for each action, and delineates timelines.

The Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada (Parks Canada 2016) includes recovery measures for ACPF species that occur within the park. The Kejimkujik action plan is consistent with recovery measures outlined in this ACPF action plan.

A socio-economic evaluation was completed and it was determined that the direct and indirect costs associated with the implementation of this action plan are considered low. The implementation will not only benefit high priority species of ACPF, but all ACPF species as well as the broader ecological community.

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1. Recovery Actions

1.1 Context and Scope of the Action Plan

Atlantic Coastal Plain Flora (ACPF) in Nova Scotia (NS) consists of a group of 94 taxonomically unrelated herbaceous plants including flowering plants, shrubs, and herbs. ACPF are generally small, slow growing, and occur in habitats such as lake shorelines, fens, bogs, and estuaries. They are poor competitors and therefore limited to habitats where low fertility and continuous natural disturbance minimizes competition from more aggressive but stress-intolerant herbaceous plants. ACPF species are at risk as a result of both biologically limiting factors (i.e. small population sizes, range limitations, and reduced sexual reproduction capabilities) and anthropogenic threats. The majority of threats occur in two broad categories, 'habitat loss and degradation' and 'changes in ecological dynamics or natural processes'. Specifically, the high priority threats are cottage and residential development, shoreline alterations, off-highway vehicle (OHV) use, infilling, peat mining, cranberry growing, and livestock and animal husbandry.

A multiple species approach to the recovery and conservation of ACPF has been adopted. The Amended Recovery Strategy and Management Plan for multiple species of Atlantic Coastal Plain Flora in Canada (Environment Canada and Parks Canada Agency 2015) (hereafter referred to as the Amended Recovery Strategy and Management Plan) addresses all legally listed (High Priority) ACPF species, as well as the ACPF species assessed provincially as 'at risk' and 'potentially at risk' within the context of all 94 ACPF species. Priorities were established within biologically relevant categories including species status, habitat, and threats. This action plan, which flows from the Amended Recovery Strategy and Management Plan, also employs a multiple species approach and includes the necessary recovery actions for all high priority ACPF including, in particular: Pink Coreopsis, Thread-leaved Sundew, Water Pennywort, Goldencrest, and Plymouth Gentian. This unique approach enabled recovery objectives and now recovery actions to be efficient and effective by targeting more than one species at a time, assisting in the prevention of additional ACPF species from becoming at risk and benefiting non-target species, ecological processes, and the environment.

This action plan will be implemented within Nova Scotia, which is the only province in Canada where the legally listed ACPF species occur. The Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada (Parks Canada 2016) includes recovery measures for ACPF species that occur within the park. The Kejimkujik action plan is consistent with recovery measures outlined in this ACPF action plan.

1.2 Measures to be Taken and Implementation Schedule

The recovery measures outlined in Table 1 are arranged according to the seven objectives outlined in the Amended Recovery Strategy and Management Plan. These measures address all High priority ACPF species. Please refer to the Amended Recovery Strategy and Management Plan Appendices for the most recent list of High Priority ACPF species.

Recovery measures below pertain to all High Priority ACPF species unless otherwise indicated.

Table 1. Implementation schedule for all recovery measures for all High Priority ACPF species.

#	Recovery Measure	Priority[1]	Cross-Over with Objecti-ves[2]	Threats Addressed[3]	Timeline
Objective 1. Protect all populations and their habitats at all high priority lakeshores, bogs/fens, and estuaries/coastal habitats as well as medium priority lakeshores.					
1.1	**Develop a comprehensive habitat conservation and protection plan by doing the following actions**				
1.1.1	Conduct a detailed assessment and review of land tenure for all locations where critical habitat is identified	H		All except D.2, E.1, and F.1	2018
1.1.2	Consider and integrate the watershed scale and the importance of maintaining ecological function into the habitat conservation and protection plan	H			2016-2020
1.1.3	Develop and implement a process to monitor the cost-effectiveness of various protection approaches	H		All current threats	2015-2020
1.2	**Employ *legal and regulatory* approaches to protect habitat at all priority locations**				
1.2.1	Evaluate the appropriateness of designating ***core habitat*** protection under the *NS Endangered Species Act* (NS ESA) and apply where appropriate	H	2, 5, 6	All except D.2, E.1, and F.1	2015-2017
1.2.2	Support the designation of additional ***protected areas*** for all priority locations	H			Ongoing
1.2.3	Support the implementation of ***regulations and policies*** (i.e. agriculture, forestry, mink farming, development)	H			Ongoing
1.2.4	Work with the provincial ***Integrated Resource Management*** (IRM) planning process to further habitat protection	H			Ongoing
1.2.5	Support and encourage *enforcement* of all existing laws and regulations pertaining to threats impacting ACPF and their habitats, including appropriate species at risk training and seek amendments and/or increased resources for enforcement, where appropriate [Cross-over action with Objective 2]	H			Ongoing

1.3	**Employ *securement* approaches to protect habitat at all priority locations**				
1.3.1	Use *securement* approaches on private land including: conservation easements; purchase; or donations	H	5	All except D.2; E.1, and F.1	Ongoing
1.3.2	Assist in the targeting of land securement for priority ACPF habitats and provide support for the establishment of a permanent funding mechanism for private land securement in NS	M			2015-2020
1.4	**Employ *stewardship* approaches to protect habitat at all priority locations**				
1.4.1	Continue establishing informal stewardship agreements with landowners and evaluate their effectiveness in securing the long-term protection of species and habitats	H	5, 6	All except F.1	2015-2020
1.4.2	Use education and stewardship initiatives to increase people's awareness of ACPF and their threats, and understanding of their role in the protection of ACPF and their habitat	H			Ongoing
1.5	**Coordinate ACPF recovery and conservation with recovery efforts for other species at risk**				
1.5.1	Meet, collaborate, and coordinate efforts with other species at risk Recovery Teams, including: Eastern Ribbonsnake, Blanding's Turtle, and Atlantic Whitefish	L	2, 3, 4, 5, 6	All current threats	Ongoing
Objective 2. Prevent, remove, and/or reduce threats to species and habitats, including all high priority threats on lakeshores, at bogs/fens, and at estuaries/coastal habitats.					
2.1	**Recognizing that actions target more than one High Priority threat at a time, develop a strategy with multiple approaches to prevent, remove, and reduce the High Priority threats: *cottage development (sub-divisions, septic systems), shoreline alterations (wharves), infilling, road construction, Off-Highway Vehicles (OHVs), mink farming, peat mining, and cranberry farming***				
2.1.1	Produce distribution maps for all High priority species and locations at appropriate scales and make them available online (with varying level of detail) to provincial departments, municipalities, landowners, public, and ACPF Recovery Team to assist them in the prevention, removal and reduction of threats	H	1, 3, 4, 5, 6	A; B; C; D	2015-2017
2.1.2	Develop and implement a ***simple and streamlined processes*** to flag provincial and municipal decisions at high priority locations for permitting, licensing, and regulation of human activities that are a high priority threat to ACPF	M			2015-2020
2.1.3	Develop and implement ***reporting protocols*** to track threats such as: number of permits for wharves, infilling, septic, sub-divisions, and use this information to direct adaptive management approaches	H			2015-2020

2.1.4	Through threat monitoring and improved reporting protocols, track violations and infractions and review the effectiveness of ***laws and regulations*** and seek amendments, where appropriate [See also Action 1.2.6 enforcement]	H			2015-2017
2.1.5	Develop and implement ***stewardship and education*** approaches to prevent, remove and reduce threats, recognizing that initiatives should address more than one priority threat at a time and engage all relevant stakeholders (i.e. landowners, cottage associations, OHV clubs, developers, industries, municipalities and provincial departments)	H			Ongoing
2.1.6	Develop a method for assessing and monitoring the ***cumulative effects*** of threats at each priority location and within the watershed as it pertains to ecological function	L	1,4	All threats	2018-2020
2.2	**Determine approaches to prevent, reduce and/or remove high priority threats**				
2.2.1	Regarding ***dam operations***, examine possible changes to the water management regime on the Tusket River system	M	1,5	A. 12; B. 3	2016-2020
2.2.2	Regarding ***animal husbandry***, ensure guidelines exist for mink farm permits, assist in the establishment of regulations, work to reduce impacts of existing mink farms on water quality	H	1,5	A. 7 & 13; C. 1	Ongoing
2.2.3	Regarding ***livestock farming***, assist in developing a regulatory framework for livestock farming, particularly ensuring that impacts around lakeshores are mitigated	H			Ongoing
2.4.1	Continue regular monitoring of ***alien invasive species*** in order to facilitate early intervention of potential problems	M	1	E. 1	Ongoing
Objective 3. Determine and update information on population abundance and distribution, habitat availability and suitability, and threats.					
3.1	**Develop a long-term monitoring program for population abundance and distribution, population trends, threats, and habitat conditions for all High priority locations**				
3.1.1	Implement species-specific methods for surveying populations and habitats and implement monitoring of threats, particularly water quality, shoreline alterations (i.e. photo inventories and repeat photography), and landuse activities (i.e. wharves, infilling, and sub-divisions) [See also Action 2.1.3 reporting protocols]	H	5	All current threats	Ongoing
3.1.2	Maintain existing databases for all species, habitat, and threat data to ensure that all survey data are up to date, well documented, and readily accessible	M			Ongoing

3.1.3	Continue to coordinate and integrate monitoring programs and coordinate monitoring efforts between volunteer monitoring programs and academic, industry, and government research	M			Ongoing
3.1.4	Continue to implement strategic plan for inventory work or monitoring at high priority locations	H		All current threats	Ongoing
3.2	**Implement the monitoring program at all High priority locations and analyze data on populations, habitats and threats**				
3.2.1	Conduct inventories necessary to ensure adequate baseline data on population abundance and distribution, habitats (availability and suitability), and threats exist for all High priority locations	H		All current threats	2016
3.2.2	Conduct regular monitoring of population abundance and distribution at all High priority locations, using methods established within the monitoring program and assess data to determine status and trends and produce maps of occupied and suitable habitat	H			Ongoing
3.2.3	Monitor on a regular basis the integrity of all secured sites (secured as outlined in Action 1.3)	H	1		Ongoing
3.2.4	Implement threat monitoring program for water quality, shoreline alterations, and for landuse activities and regularly evaluate its effectiveness	H	5		2015-2022
3.3	**Conduct targeted surveys**				
3.3.1	Conduct targeted surveys for High priority species identified as likely to be more widely present than currently documented	L		All current threats	2015-2020
3.3.3	Conduct targeted surveys of areas with suitable habitat for the Undetermined ranked (or data-deficient) species	L			2018-2020
Objective 4. Attain information on population biology, diversity and ecological requirements needed to support conservation and recovery.					
4.1	**Conduct biological and ecological research required to address knowledge gaps**				
4.1.1	Improve understanding of population biology through studies of factors such as reproduction (seed production and recruitment), seed banking dispersal, as well as the importance of watershed-level processes	M		All current threats	2015-2020
4.1.2	Examine the role of sexual and asexual reproduction in species population viability	M			2018-2020

4.1.3	Evaluate pollination and how a lack of pollination might limit persistence and growth and examine habitat requirements for pollinators	M			2018-2020
4.1.4	Examine genetic diversity, particularly between US and NS populations to determine if the NS populations are distinct, whether they are irreplaceable global populations, or if they are similar to the US populations and therefore may serve as a source population for the highly threatened populations in the US	L			2020
4.1.5	Determine the extent of threats and the pathways through which they are impacting species and habitats, particularly for high priority threats and threats where severity is unknown or causal certainty is low	H	2		2015-2020
4.1.6	Develop a gene and seed bank as tools in support of long-term conservation and recovery planning	L	1, 7		2020
4.1.7	Assess the importance of rivers in terms of population distribution and dispersal within the watershed	H	1, 3		2020
4.1.8	Evaluate ecological processes and factors such as natural disturbance regimes, pollination, seed dispersal, and cumulative effects of threats, to determine their impact on how habitat is characterized	H	3		2020
4.2	**Coordinate and collaborate with others on ACPF research, recovery, and conservation**				
4.2.1	Establish an international network to foster cooperation and coordination of conservation and recovery efforts for ACPF throughout their range and organize and host the second international conference on ACPF	L	1, 2, 3, 5, 6	All current threats	2020
4.2.2	Formalize and expand communication networks already established between ACPF researchers on a project-by-project, species-by-species basis within NS [See also Actions 1.5.1 and 3.1.3]	L			2016
4.2.3	Ensure collaboration and coordination with other species at risk Recovery Teams with regards to Traditional Ecological Knowledge (TEK) projects	M			2015-2020

Objective 5. Continue and/or implement stewardship activities at the 53 high priority lakeshores and 56 high priority bogs/fens and the 12 medium priority lakeshores.					
5.1	**Ensure organizational structure is in place to support stewardship initiatives**				
5.1.1	Coordinate and collaborate with other stewardship initiatives on species at risk that are ongoing within SW NS and continue to build financial support for stewardship work in SW NS	H		All current threats	Ongoing
5.1.2	Continue to implement a two tier, phased and/or pulsed, approach for all stewardship initiatives: I. Broadcast stewardship targeting everyone (i.e. all cottage associations) and II. Directed stewardship which targets specific audiences (i.e. landowners with ACPF on their shoreline or dedicated youth within the community)	H			Ongoing
5.1.3	Coordinate stewardship initiatives and use key messages common to all target audiences [See also Actions under Objective 6]	M			Ongoing
5.2	**Continue and improve stewardship initiatives with relevant stakeholders and partners**				
5.2.1	Continue to build relationships with ***landowners*** already contacted and expand initial landowner contact, to include High priority locations which have not yet been targeted and priority sites already targeted where landownership has changed	H	1, 2, 3, 6	All except A. 11; D.2; E.1, and F.1	Ongoing
5.2.2	Engage all ***cottage associations and OHV clubs*** at each of the High priority locations and develop appropriate stewardship initiatives	H			Ongoing
5.2.3	Engage all ***companies and industries*** with land immediately adjacent to High priority locations or users of these lands and work with these stakeholders (providing examples of things they could do) to develop stewardship initiatives that reduce or remove High priority threats to ACPF	H	1, 2, 3, 6	A. 1, 2,4-10, 12-13-; B. 1-6; C. 1-3	Ongoing
5.2.4	Encourage and support ***Mi'kmaq*** participation in all aspects of ACPF conservation and recovery	M	2, 4	All current threats	Ongoing
5.3	**Develop a volunteer program for monitoring populations, shoreline threats, and water quality at high priority locations**				
5.3.1	Continue to recruit and train volunteers in the monitoring of threats at High priority locations using established threat monitoring protocols, including collection of photo data of lakeshores, landuse activities, and water quality	H	1, 2, 3, 6	A. 1-10, 12-13; B. 1-6; C. 1-3; D. 1-2	Ongoing
5.3.2	Expand implementation of the revised and modified volunteer monitoring program that adopts new monitoring protocols	H			Ongoing

Objective 6. Increase public awareness and education pertaining to the existence, threats, and conservation value of all high priority species and their habitats.					
6.1	**Continue to develop and strengthen education and outreach initiatives**				
6.1.1	As with stewardship, implement a two tier, phased and/or pulsed, approach to education initiatives that adopts: I. ***Broadcast education*** targeting everyone (e.g. public talks) and II. ***Directed education*** targeting specific audiences (e.g. door to door visits with landowners with ACPF on their shoreline or mentoring dedicated youth within the community)	H	5	All current threats	Ongoing
6.1.2	Continue to make available a diversity of ***public talks, the ACPF website, and online videos*** to ensure that all important audiences are reached, including, residents, landowners, school and youth groups, naturalist groups, staff of municipal, provincial and federal governments, land developers, and non-government organizations	H			Ongoing
6.1.3	Develop and distribute ***new print materials*** targeted to specific audiences (i.e. cottage associations, OHV clubs), or messages (i.e. new protected area), or threats (i.e. water quality)	H			Ongoing
6.1.4	Continue to use and distribute ***existing print material*** regarding ACPF conservation and recovery (i.e. ACPF poster, alien invasive species brochure, landowner stewardship guide, ACPF Field Guide)	H			Ongoing
6.1.5	Improve the presence and visibility of ***signs*** (awareness and educational) at high priority sites	M			Ongoing
6.1.6	Determine the best means to assess the ***effectiveness of education activities*** and stewardship projects in influencing individuals to participate in conservation and recovery actions and take steps to improve their effectiveness [See also actions under Objective 5]	H			2017-2020
Objective 7. Define needs and methods for implementing restoration for Pink Coreopsis, Water Pennywort, and Plymouth Gentian.					
7.1	Assess habitat restoration methods, determine potential sites for implementation, evaluate options, and determine whether there are barriers to restoration of specific populations of some species, or to restoration of extirpated populations	M	1, 4, KG	All current threats	2020
7.2	Explore propagation techniques as a potential tool for recovery and potentially apply these techniques	L	1, 4		2020

[1] "Priority" reflects the degree to which the measure contributes directly to the recovery of the species or is an essential precursor to a measure that contributes to the recovery of the species. High priority measures are considered those most likely to have an immediate and/or direct influence on attaining the population and distribution objectives for species. Medium priority measures may have a less immediate or less direct influence on reaching the population and distribution objectives, but are still important for recovery of the population. Low priority recovery

measures will likely have an indirect or gradual influence on reaching the population and distribution objectives, but are considered important contributions to the knowledge base and/or public involvement and acceptance of species.

[2] There is a cross-over with actions for other objectives of the Amended Recovery Strategy and Management Plan

[3] Alphanumeric codes referred to in 'Threats addressed' column of this table are summarized here (full threat table can be found in Table 8 of the Amended Recovery Strategy and Management Plan.

A. THREAT CATEGORY: Habitat Loss or Degradation
1. Cottage and residential development / 2. Shoreline alterations/ 3. Off-highway vehicle (OHV) use/ 4. Infilling/ 5. Forest harvesting practices/ 6. Agricultural practices/ 7. Animal husbandry (*i.e.* mink)/ 8. Peat mining/ 9. Cranberry growing/ 10. Road construction/ 11. Diatomaceous earth mining/ 12. Dam construction (Hydroelectric)/ 13. Livestock (i.e, pigs)

B. THREAT CATEGORY: Changes in Ecological Dynamics or Natural Processes
1. Cottage and residential development/ 2. Shoreline alterations/ 3. Dam operation (Hydroelectric) / 4. Forest harvesting practices and Agricultural practices / 5. Peat mining / 6. Cranberry growing

C. THREAT CATEGORY: Pollution
1. Waste Water (*i.e.* septic, industrial, livestock, animal husbandry) / 2. Pesticide Use / 3. Gas and oil leakage and spills

D. THREAT CATEGORY: Disturbance or Persecution
1. Off-highway vehicle (OHV) use / 2. Picking and trampling

E. THREAT CATEGORY: Exotic or Invasive Species
1. Various plant species

F. THREAT CATEGORY: Climate and Natural Disasters
1. Climate change

1.3 Critical Habitat

1.3.1 Identification of the Species' Critical Habitat

The critical habitat deemed necessary to meet the population and distribution objectives for all federally listed threatened and endangered ACPF species was identified in Section 2.6 of the Amended Recovery Strategy and Management Plan (Environment Canada and Parks Canada Agency 2015). The Amended Recovery Strategy and Management Plan also contains details about the identified critical habitat including its geospatial extent and biophysical attributes (section 2.6.2) and the activities likely to destroy critical habitat (2.6.3). Please refer to that document for details.

1.4 Proposed Measures to Protect Critical Habitat

Water Pennywort is the only species with critical habitat that occurs on federal land, along the shores of Kejimkujik Lake located within Kejimkujik National Park. As required under SARA, a description of Water Pennywort critical habitat in Kejimkujik National Park of Canada was published in *Canada Gazette* Part 1 (Nov. 2010). Water Pennywort critical habitat located in Kejimkujik National Park and National Historic Site is legally protected from destruction under s.58 (1) of SARA.

With regard to the portions of critical habitat on non-federal lands, Environment and Climate Change Canada will assess the protection currently in place. This involves working with the Government of Nova Scotia to determine which provincial laws and legal instruments are in place to prevent destruction of critical habitat. If there are gaps in the protection of critical habitat, provisions or measures in place under SARA or other federal legislation will be reviewed to determine whether they prevent destruction of critical habitat. The laws and legal agreements in place that protect critical habitat will be monitored for efficacy at least every five years. Conservation measures, including stewardship initiatives, that contribute to preventing critical habitat destruction will also be considered and monitored.

If it is determined that any portions of critical habitat are not protected, and steps are being taken to protect those portions, those steps will be communicated via the Species at Risk Public Registry through the reports referred to in section 63 of SARA.

2. Socio-economic Evaluation

The *Species At Risk Act* requires that an action plan include an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation (SARA 49(1)(e), 2002). This evaluation addresses only the incremental socio-economic costs of implementing this action plan from a national perspective as well as the social and environmental benefits that would occur if the action plan were implemented in its entirety, recognizing that not all aspects of its implementation are under the jurisdiction of the federal government. It does not address cumulative costs of

species recovery in general nor does it attempt a cost-benefit analysis. Its intent is to inform the public and to guide decision making on implementation of the action plan by partners.

The protection and recovery of species at risk can result in both benefits and costs. The Act recognizes that "*wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons*" (SARA 2002). Self-sustaining and healthy ecosystems with their various elements in place, including species at risk, contribute positively to the livelihoods and the quality of life of all Canadians. A review of the literature confirms that Canadians value the preservation and conservation of species in and of themselves. Actions taken to preserve a species, such as habitat protection and restoration, are also valued. In addition, the more an action contributes to the recovery of a species, the higher the value the public places on such actions (Loomis and White, 1996; DFO., 2008). Furthermore, the conservation of species at risk is an important component of the Government of Canada's commitment to conserving biological diversity under the International Convention on Biological Diversity. The Government of Canada has also made a commitment to protect and recover species at risk through the Accord for the Protection of Species at Risk. The specific costs and benefits associated with this action plan are described below.

2.1 Socio-economic Costs of Implementing this Action Plan

Direct costs are those that result from the implementation of the recovery measures identified in the implementation schedule of the action plan (Table 1). The direct costs of implementing this action plan over the short-term, five year period (2015-2020) is expected to be low (between $0 and $5 million). These anticipated costs include salary, volunteer time, travel, materials, equipment and other related costs.

Indirect costs are the potential costs associated with implementing the action plan, which may have an impact on various stakeholders. Impacts to stakeholders include foregoing or modifying current and future activities. The anticipated indirect costs of implementing this action plan are considered low.

All locations for these species occur on provincial or private land with the exception of one location for Water Pennywort, which is in Kejimkujik National Park of Canada. Many of the activities identified as threats to these species or likely to destroy critical habitat are already prohibited under existing legislation and regulations. The province of Nova Scotia has access to many legislative, regulatory, and management tools for the conservation and stewardship of Atlantic Coastal Plain Flora (e.g., *Nova Scotia Endangered Species Act*, *NS Special Places Protection Act*, and *NS Environment Act*). Additionally, many recovery measures can be carried out by federal or provincial species at risk funding programs, in-kind contributions by recovery biologists, or research by universities.

Cottage/residential development and associated activities like shoreline alterations[4], road building, land clearing, septic systems, and landscaping are ongoing threats to the ACPF and its habitat. There is a high potential for cottage and residential development in certain areas that contain critical habitat. Based on property information for thirteen lakes, shoreline residential development is projected to increase by an average of 99% in the Tusket River Watershed (Eaton and Boates, 2002). The Tusket River watershed was identified in the Amended Recovery Strategy and Management Plan as a high priority watershed, containing five species at risk. In order to protect ACPF with respect to cottage/residential development and associated activities, regulatory changes may be required if current regulations do not sufficiently protect these species and their critical habitat. This may result in impacts on cottage/residential development; however, it is difficult to estimate any such impact at this time.

Crop production, mink farming and fish processing can pose a threat to ACPF habitat and production facilities already exist in close proximity to some high priority ACPF lakes. In order to manage these activities, the action plan proposes measures to ensure effective regulation and policies are in place. If new regulations are developed the impacts will be related to the costs associated with industry compliance. Impacts to crop production, mink farming and fish processing are unknown as existing legislation may be sufficient to manage these activities.

Forest harvesting practices can result in nutrient runoff or alteration of the hydrologic regime. Forest harvesting occurs on leased crown land as well as small privately owned woodlots in close proximity to lakeshores. It is anticipated that the impacts to forestry would be limited as the impacts associated with the action plan would only be related to the need to maintain a buffer along lakeshores to reduce nutrient runoff. Forest harvesting regulations already requires a buffer along watercourses.

Hydroelectric dam operation can affect watershed hydrology by regulating water levels and thereby altering natural water level fluctuations and stabilizing water levels. The Tusket River watershed includes six hydroelectric dams which contributes approximately 1% of the province's hydropower. Impacts of alterations to the water management regime will be associated with the cost of implementing any changes to behaviour. At this time, the impacts of any specific activities associated with alterations to the water management regime or any modifications that may be required, are unknown and therefore it is difficult to estimate the impact.

Cranberry growing and peat mining have also been identified as threats to ACPF species that occur in bog and fen habitats. However, impacts of this action plan on these industries are expected to be minimal since Endangered and Threatened ACPF species occur in only 8 bogs in the province. Also, the *NS Endangered Species Act* already affords protection to the ACPF species that occur in these bogs and fens.

[4] Shoreline alterations include mowing and raking, construction of boat docks and launches, wharves, and breakwaters.

2.2 Benefits of Implementing this Action Plan

Biodiversity is essential for healthy ecosystems, human health, prosperity, security and well-being. Canadians derive many benefits from biodiversity including recreational, aesthetic, educational, cultural benefits as well as ecological goods and services essential to human survival. Care for the environment is consistently ranked as one of Canada's top priorities in public opinion polls (Canada's Fourth National Report to the United Nations Convention on Biological Diversity , 2010). A recent opinion poll found that three quarters of Canadian respondents feel that preserving natural areas and the variety of native plant and animal life in Canada is important to them (Ipsos Reid Opinion Poll, 2011).

The total value of endangered species consists of non-consumptive use values (such as recreation, spiritual/cultural, research and education), indirect use values (value of the ecological role of a species in an ecosystem) and non-use values (i.e. preserving the benefits of nature for future generations)[5]. Achieving the objectives of this action plan will have a positive impact on society.

In the Amended Recovery Strategy and Management Plan, high priority habitat types were identified for ACPF species at risk, including; *lakes, bogs/fens, rivers,* and *estuaries.* Forty-one wetlands (bogs and fens) were identified as high priority for recovery actions. The recovery measures identified will lead to the protection of these wetlands and the associated goods and services that wetlands supply. Only 8 of these wetlands have Endangered and Threatened species and are thus identified as critical habitat and afforded protection under SARA, however, this action plan proposes recovery measures for species within all of the priority wetland habitats.

Wetland ecosystems provide a number of goods and services that can be categorized as provisional goods, regulating services, habitat/support, cultural services and supporting services (Millennium Assessment Report, 2003 and TEEB, 2010). Important ecological services may be neglected in policy analysis because there are few suitable empirical studies from which benefits may be transferred.

Wetlands provide a wide range of socio-economic benefits including flood control, filtering contaminants, carbon sequestration, coastal protection, regulating drinking water supply, supporting plant life, and supporting recreational activities. According to a Genuine Progress Index (GPI) Atlantic study on the province's water resource values, Nova Scotia's wetlands provide an estimated $7.9 billion worth of benefits in ecosystem services to Nova Scotians annually and wetland loss to development in Nova Scotia has resulted in an estimated $2.3 billion cost annually in terms of lost ecological services such as water purification, recharging drinking waters and enhancing fishery productivity (Nova Scotia Wetland Conservation Policy, 2009).

[5] Non-use values include bequest value (satisfaction of knowing that future generations will have access to nature's benefits), altruist value (satisfaction of knowing that other people have access to nature's benefits) and existence value (satisfaction of knowing that a species or ecosystem exists).

In Nova Scotia, ACPF consists of a unique suite of 94 plants, of which 10 are legally listed under both SARA and the NS ESA and a further 3 are listed under the NS ESA. An additional 13 ACPF species 'may be at risk' and 16 are 'sensitive' under the provincial General Status Ranks. All 94 ACPF species will benefit from protection as a result of this action plan, as will several associated plant species, and species from other taxa (e.g. pollinator insects, fish species and aquatic insects). Other species at risk that will benefit from protection include: Eastern Ribbonsnake, Blanding's Turtle, and Atlantic Whitefish. The measures outlined in this action plan offer a cost effective way of maximizing conservation and will benefit the broader ecological community.

2.3 Distributional Impacts

Atlantic Coastal Plain Flora occur on provincial, federal, and private properties. Private landowners are not expected to bear a disproportionate amount of responsibility for the recovery of these species. Rather, recovery efforts will primarily build on current stewardship and landowner initiatives, with assistance from non-governmental organizations which are active where Atlantic Coastal Plain Flora occur.

3. Measuring Progress

The performance indicators presented in the Amended Recovery Strategy and Management Plan provide a way to define and measure progress toward achieving the population and distribution objectives.

Reporting on *implementation* of the action plan (under s. 55 of SARA) will be done by assessing progress towards implementing the broad strategies.

Reporting on the ecological and socio-economic impacts of the action plan (under s. 55 of SARA) will be done by assessing the results of monitoring the recovery of the species and its long term viability, and by assessing the implementation of the action plan.

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Appendix 1: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*[6]. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the Federal Sustainable Development Strategy's[7] (FSDS) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the plan itself, but are also summarized below in this statement.

This action plan will clearly benefit the environment by promoting the recovery of Atlantic Coastal Plain Flora. The potential for the plan to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this plan will clearly benefit the environment and will not entail any significant adverse effects. This multiple species action plan adopts an ecosystem perspective including all 94 ACPF species in Nova Scotia, with particular focus on the legally listed ACPF species. Recovery at this scale will help to address immediate threats and offer protection to legally listed ACPF species, while also increasing the likelihood of long-term persistence of associated ACPF species not at risk. The reader should refer to relevant sections in this document (Actions and Performance Measures; and, particularly, the Socio-economic Evaluation) and in the Amended Recovery Strategy and Management Plan (Ecological Role; Limiting Factors; Threats; Critical Habitat; Approaches Recommended to Meet Recovery Objectives; and Effects on Other Species).

[6] www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1
[7] www.ec.gc.ca/dd-sd/default.asp?lang=En&n=F93CD795-1